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ABSTRACT

The focus of this paper is on the complex interaction between teacher behavior and learner outcomes and the search for associational and causal relationships between them. Both the results from research conducted in this area and the methodology used to conduct the studies are examined. Answers to the following questions are reported. What links between teacher behavior and learner outcomes have been identified? Which of these links have been validated as to their efficacy in realizing instructional ends? What research methodology has been used and how effective has it been? A critical evaluation is included that looks at the generalizability of results to other populations and environments, as well as an assessment of future research needs and possibilities in further establishing links between teacher behavior and learner outcomes. (Author)

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ESTABLISHING LINKS BETWEEN TEACHER BEHAVIOR AND LEARNER OUTCOMES

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ESTABLISHING LINKS BETWEEN TEACHER BEHAVIOR AND LEARNER OUTCOMES

In many teacher education programs, students are presented with a series of "do's" and "don'ts" about how to behave in the classroom. Warnings are given about too much or too little praise, about type and level of questions, and about the timing of such questions. In addition, lesson plans are evaluated in terms of the presence or absence of plans to use "accepted" behaviors and micro-teaching situations are scrutinized to pinpoint instances of faulty technique.

The entire Competency/Performance Based Teacher Education (C/PBTE) model is built upon the foundation of identifying successful teaching behaviors and assisting students to acquire and demonstrate them. It would appear legitimate to ask: on what types of research findings are the selections of teaching competencies based? What evidence exists to support or refute the claim that specific teaching behavior induce specific responses on the part of students?

Figure 1 provides a model for organizing the evidence of research findings on teacher effectiveness (Dunkin and Biddle, 1974). It portrays different regions or clusters of variables that may have some influence on teacher behavior and learner outcomes. Behaviors that occur in the natural setting of the classroom are termed process variables. Product variables are the immediate or long term effects on pupils and are usually measured in terms of achievement or attitude. Antecedents to teacher classroom behavior are termed presage variables and include personological and environmental factors. Context variables are those over which the teacher has little control. Class size and pupil formative experiences are two examples. The arrows imply a causative relationship and suggest a time line.

Examples of the type of findings that would be organized under these variables are:

1. Process-Product

   Teacher use of high cognitive level questioning does/does not produce higher pupil achievement (Aagaard, 1973) (Martikean, 1973).

2. Process-Process

   Wait-time is associated with the number and kind of questions asked by the teacher (Rowe, 1973).

3. Presage-Process

   Training teachers in question classification systems does/does not result in their asking higher cognitive level questions in the classroom (Farley and Clegg, 1969) (Clegg, 1967).

4. Context-Process

   Teachers using new science curricula (AAAS - SCIS) exhibit higher cognitive questioning behavior than do teachers not using these programs. (Riley, 1977) (Bruce, 1971)

While research exploring each of these relationships is germane to the effort of establishing links between teacher behavior and learner outcomes, the foundation or sine qua non rests on the strength of the findings of process-product research.

Results of Process Product Research

After over fifty years and hundreds of studies, the descriptors of process product findings are surprisingly cautious. Results are referred to not as having evolved out of the research literature but teased out. They are described not as empirical but as fragile results; not pointed out as support but rather nodded toward.

Rosenshine and Furst (1971), in an extensive review of process product research, identified the following variables as "most promising" clarity, variability, enthusiasm task orientation, student opportunity to learn

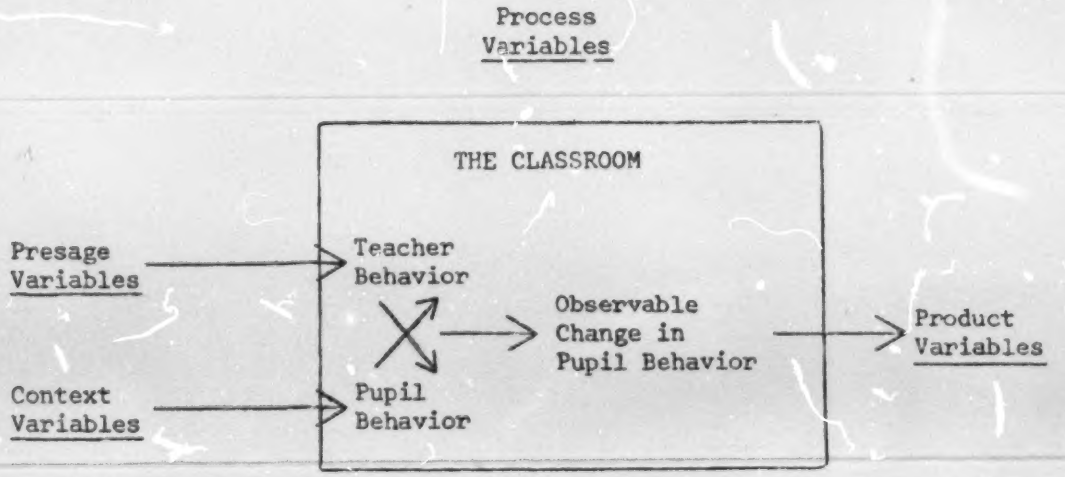

Figure 1. (After Dunkin and Biddle, 1974, p. 38)

criterion material, use of student ideas and general indirectness, criterion, use of structuring comments types of questions, probing, level of difficulty of instruction.

The reviewers provided operational definitions for these variables, however, they lack the specificity which would allow them to be identified as emperically established linkages between teacher and student outcomes. According to the authors, "...these are not variables which can be placed in teacher education programs with the assurance that training teachers in these behaviors will enhance student performance. Much more study is needed before those behaviors and their effects will be clarified" (Rosenshine and Furst, 1971, p. 43).

In another major review of teaching effectiveness Dunkin and Biddle (1974) organized the findings of hundreds of studies of teacher effectiveness to determine which were most worthy of implementation and further research. Listing studies into a dichotomy based on whether the study was statistically significant or nonsignificant, the reviewers were able to come up with suggestive rather than definitive results. Their strongest statements were for findings that held null hypotheses to be tenable, that there were no significant differences. Among the variables identified as having little research support were warmer, less directive classroom climates and teacher use of divergent questions or higher levels of discourse.

To understand reasons for the paucity of definitive results in process-product research, one must be aware of the methodological problems facing the study of teaching.

Methodology (Problems)

Research on process product variables utilize one of two research models, the correlational and the experimental. In correlational studies,

behaviors are identified which are hypothesized to affect student performance. Observations of the presence or absence of such behavior, or the frequency of its exhibition is then used as a correlate with pupil performance. Experimental studies identify behaviors, establish situations where the behavior is specifically exhibited, and student performance is then measured.

Ideally, these two techniques do not exist in isolation from each other. Instead, they are parts of a continuum.

Rosenshine and Furst have suggested a model for establishing relationships between teaching behaviors/classroom activities, and student performance. This paradigm, or model, would contain at least these elements:

1. development of procedures for describing teaching in a quantitative manner;
2. correlational studies in which the descriptive variables are related to measures of student growth;
3. experimental studies in which the significant variables obtained in the correlational studies are tested in a more controlled situation. (Rosenshine and Furst, 1973, p. 122)

The authors define these steps as "...the criteria against which efforts labeled 'research on teaching in natural settings' will be judged...."

To date, a very large percentage of process product studies have been of the correlational variety. Logical as the progression may seem, researchers appear reluctant or unable to follow it. Rosenshine and Furst (1973, p. 122) describe the state of the art in this way

> Developers of descriptive systems have seldom moved to correlational studies; investigators who conducted correlational studies have seldom moved to experimental studies; investigators who conducted experimental studies have not used their results to develop new descriptive systems or to conduct further correlational and experimental studies.

As a result, Berliner (1976, p. 5) states

> There is not now, and there will not be for some time, any empirical evidence on which to base policy. Extremely important problems hamper the study of teachers and teaching in all subject matter areas. It will take years before these problems can even be understood well enough to do classroom research properly.

In further defining the problems to which he refers, Berliner identifies three major areas of concern in research on teacher effectiveness. These areas are: Instrumentation, Methodology, and Statistics. A summary of specific problems discussed in each area is presented in Figure 2.

Figure 2

Problems Identified by Berliner Which Act as Impediments to the Study of Teacher Effectiveness

Instrumentation	Methodology	Statistics
1. Dependent variable	1. Student background	1. Measuring change without a true experimental design
a. standardized tests	2. Subject matter	
b. tests for special units	3. Normative studies & Volunteer Samples	2. Procedures used do not adequately meet requirements of situation under study.
c. multivariate outcomes	4. Individual Differences among Students	
2. Independent variables	5. Student Behavior	
a. appropriateness of behavior	6. Construct Validation	
b. unit of analysis for I.V.	7. Generalizability of measures	
c. Stability of behavior		

Berliner (1976, p. 12) concludes his assessment of problem areas in research on teacher effectiveness on a very pessimistic note

> When we have finished examining this potpourri of problems, issues, and concerns, we will be ready to begin the scientific study of teaching. And if we cannot deal with all of these problems, perhaps we should simply acknowledge that teaching is, after all, a very complex set of events which cannot be easily understood.

In a review of approximately 50 studies related to teacher effectiveness as measured by student performance, Rosenshine and Furst (1970) identified

many problems similar to those of Berliner. Because so many studies were correlational, one problem associated with attempting to generalize across studies deals with the type of observation record used. Three elements comprise this variability; difference in recording procedures, difference in items, and difference in format. Of four identified categories of observational instruments, number four is labeled "To Investigate Relationships Between Classroom Activities and Student Growth." Of 73 identified observational systems, only 8 were devised for this category. More may exist, but have not yet been classified.

Another area of concern in assessing studies on teacher behavior is the action of extraneous, uncontrolled context variables. Berliner (1976, p. 5) summarizes concerns expressed by some who feel that

> ...family background, socio-economic status, ethnicity, and the like are the major causal variables that affect between-school differences in achievement.

Systematic attempts to control for the action of such variables have not been made to date.

The interaction between various presage and process variables is another area of potential confounding of findings. Teaching is a complex action, composed of a great many parts and it is difficult to isolate one part and manipulate it without affecting other performance variables. As Rosenshine and Furst (1973, p. 124) state. "One of the clearest findings is that one cannot vary a behavior such as 'open questions' and expect the rest of the interaction to remain constant." Variation in questioning patterns will cause variation in amount of content presented per unit of time, frequency of teacher information giving, the number of episodes which occur per unit of time, and types of responses students give.

Coupled with the myriad of context variables exhibited by students, such as ability level, gender, interest, and apptitude, reaction to the variation of teaching behavior could potentially elicit a variety of responses. The process of establishing links between the actions and behaviors of a teacher and the performance of pupils requires a much tighter control of many variables.

Methodology (Promises)

A developing paradox in educational research may be that tightened conceptualization of findings are likely to be the result of a relaxing of conventional methodological structures. According to some researchers, most notably Gene Glass (1976) and N. L. Gage (1976), rigor has become confused with rigidity in the design and analysis of educational research.

Using the liberated methodology of meta-analysis (Glass, 1976), a term describing the quantitative determinance of the significance of combined research studies, investigators hope to break the log jam of contradicting process product findings. Rather than compiling expository research summaries by simple vote counting of significant vs. non-significant results, meta-analysis offers a means of applying statistical analysis to the task of integrating and interpreting the complex accumulation of findings.

Gage (1976) summarizes the promise of meta-analysis;

> In short, I am saying that some pessimism that has resulted from previous reviews of the literature may now be disspelled.... If these tests of combined results do indeed reveal some significant relationships between types of teacher behavior and student achievement or attitude, they suggest that the approach of seeking such so-called process-product relationships is not altogether fruitless.

Indications of increasing efforts in experimental research studies are another promising sign. Sets of experimental studies have been carried out at Florida State University (Shymansky and Matthews, 1974), Utah State University (Borg, 1975) and at the Stanford center for Research and Development in Teaching (Gage, 1976A). These factorially designed experiments have made use of the more promising variables identified in field based studies. This move from associational studies to determinance of causality through experimental studies is long over due and holds the key to establishing the linkages so eagerly sought.

Summary

The results of process-product research have been predominantly derived from correlational or field studies. Meaningful associational relationships between teacher behavior and student outcomes have been extremely difficult to ferret out of the conflicting research results reported over the past 50 years. Extensive reviews of the research have provided "promising" variables worhy of more extensive study. Recommendations that further experimental re research be conducted on these variables have been made and seconded by the educational research community. However, the response in pursuing experimental research to determine causality has been slow in developing.

Methodological problems abound in this research effort. These difficulties appear insurmontable to some while challenging temporary obstacles to others.

The promise of more fruitful analysis of previous research through the use of meta-analysis and increased experimental studies are positive indications that the establishment of process-product linkages continue to be a viable research effort.

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